

Ultra-Low Noise  
OCXOs



Crystal-Controlled  
GHz Sources



Vibration  
Insensitive  
Oscillators



PLL Oscillator  
Modules



Crystal Products  
for Space



# Company Presentation



**ADVANCED XTAL PRODUCTS**  
a  *Q-TECH Company*

**The Frequency Control Expert for over 20 Years**

Masterclocks



Frequency Distribution Units



Rubidium Oscillators  
& Atomic Clocks





# Who we are



- ✗ “AXTAL” stands for **“Advanced XTAL Products”**, where **“XTAL”** is a common abbreviation of “crystal”.
- ✗ **Founded in November 2003** by Bernd Neubig and Brigitte Neubig as fully privately owned company. Since 2023 the AXTAL GmbH is an independent subsidiary of **Q-Tech Corporation**, a US-based leading supplier of high-reliability crystal oscillators
- ✗ **Core Business** comprises advanced Frequency Control Products (FCP), i.e. mainly Crystal & SAW Oscillators and Frequency & Timing Modules. All products are ITAR free.
- ✗ **Main Product Focus** is on High-Reliability Oscillators and Frequency Control Modules with high requirements for environmental conditions, ultra-low noise performance, very high stability and frequency generation up into the GHz range for applications like microwave communication, test equipment, radar, military, aerospace and space.
- ✗ **Full Value Chain** includes R&D, design, manufacturing, screening and testing of our products from samples to production quantities completely in-house.
- ✗ **Extended Product Portfolio** includes quartz crystals & crystal filters for high-reliability applications and atomic frequency standards, which are sourced from our contract partners.



# Where we are



## AXTAL GmbH

### Facility & Administration:

(Billing & shipping address)

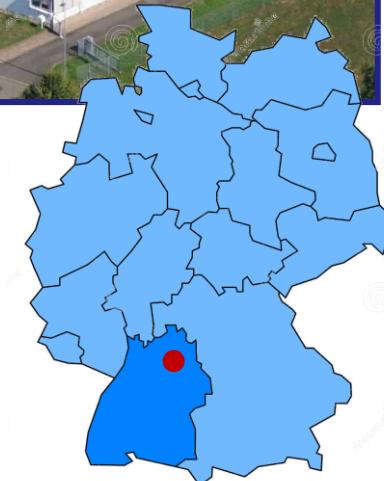
Roemerring 9

D-74821 Mosbach

Germany



*AXTAL is currently planning to expand and will move to a newly build facility in 2026 with more than 3 times the current space.*



+49 6261 939834



contact@axtal.com "General"



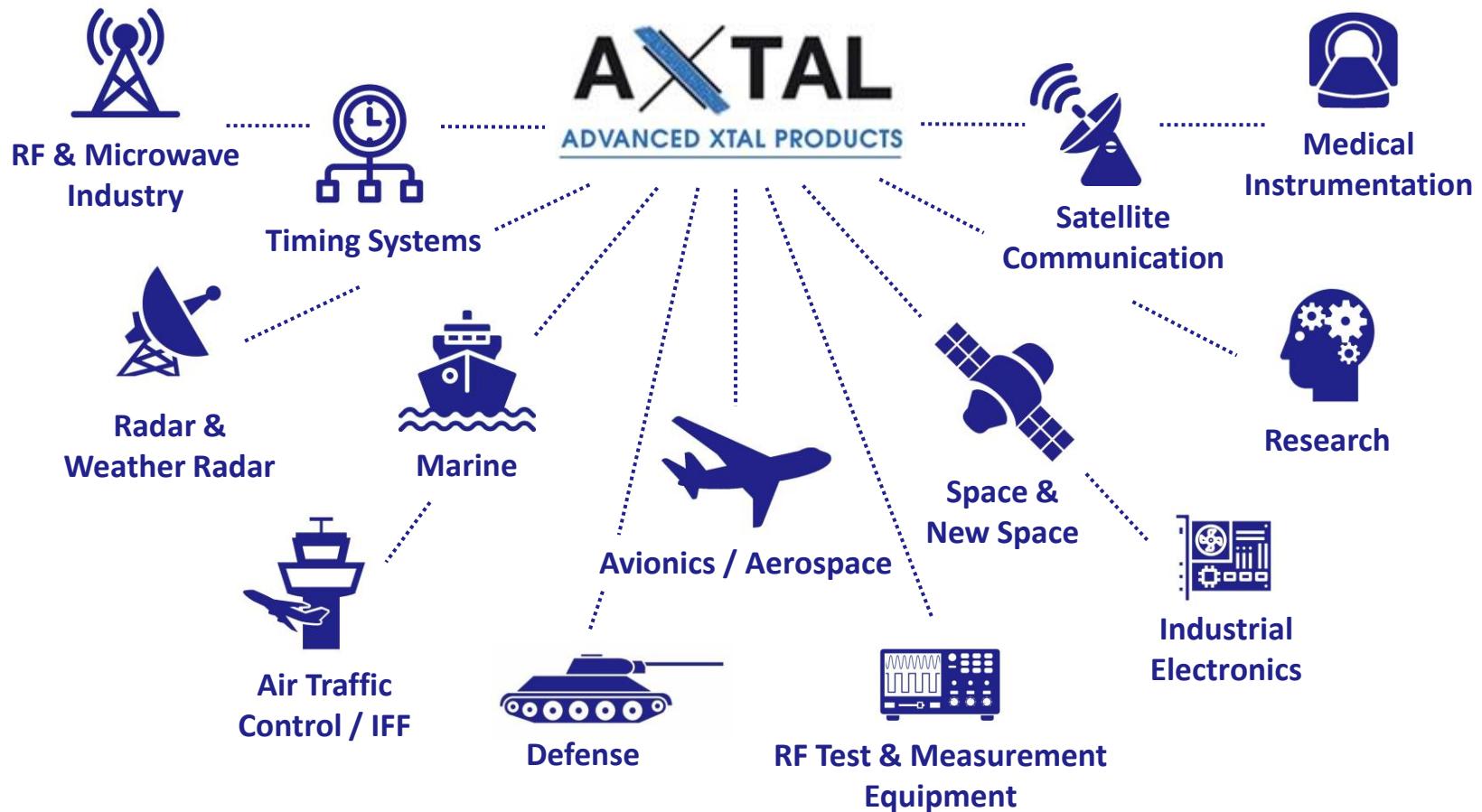
+49 6261 939836



www.axtal.com



# Markets served





# Main countries



Sales Representatives – See our Website



# Quality Management



- ✗ Since 2008: Quality management system in accordance with **ISO 9001:2015**, certified by TUEV SUED.
- ✗ Since 2024: Quality management system in accordance with **EN 9100:2018** (AS 9100), certified by TUEV SUED.
- ✗ AXTAL Quality System includes also:
  - ✗ **Extensive process control** for R&D, manufacturing and sales
  - ✗ **100% Incoming inspection** of all quality-critical components
  - ✗ **Extended testing** of quartz resonators incl. passive & active pre-aging
  - ✗ **Full traceability** of all test & measurement results
  - ✗ **100% Final test** of all key & critical parameters
  - ✗ **Workmanship** to J-STD-001, IPC-A-610 Class 3 and ESA ECSS standards



## Customer Audits

(not complete)



CHINA AEROSPACE SCIENCE AND TECHNOLOGY CORPORATION (CASC)

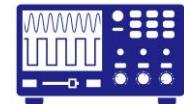




# Testing & Qualification



- ✖ **Inhouse Testing** of all electrical & environmental tests
- ✖ **Qualification Testing** to IEC 60679-4, MIL-PRF-55310, ESCC or Customer standards
- ✖ **AXTAL Test Capabilities – Electrical:**
  - ✖ **Crystal Testing** with Saunders, Kolinker and AXTAL Network Analyzer System
  - ✖ **Frequency Stability** over various parameters up to 20 GHz
  - ✖ **Output Waveform & Spectrum** up to 26 GHz
  - ✖ **Phase Noise** with R&S FSWP & FSPN and Agilent E5052B up to 26 GHz
  - ✖ **Short-term Stability** (ADEV) with Microchip 53100A down to 1E-18
  - ✖ **Long-term Stability** (Aging) measured against GPS-disciplined Atomic Clock Ensemble
  - ✖ **G-Sensitivity** & Phase Noise under vibration (random & sine) 5 ~ 6000 kHz
  - ✖ **Temperature Testing** -55°C to +125°C
- ✖ **AXTAL Test Capabilities – Environmental:**
  - ✖ **Vibration Testing:** Mechanical Shock, Random & Sine
  - ✖ **Temperature Testing:** Thermal Shock, Storage & Burn-in -60°C to +150°C
  - ✖ **Vacuum Testing**
  - ✖ **Fine & Gross Leak Testing**





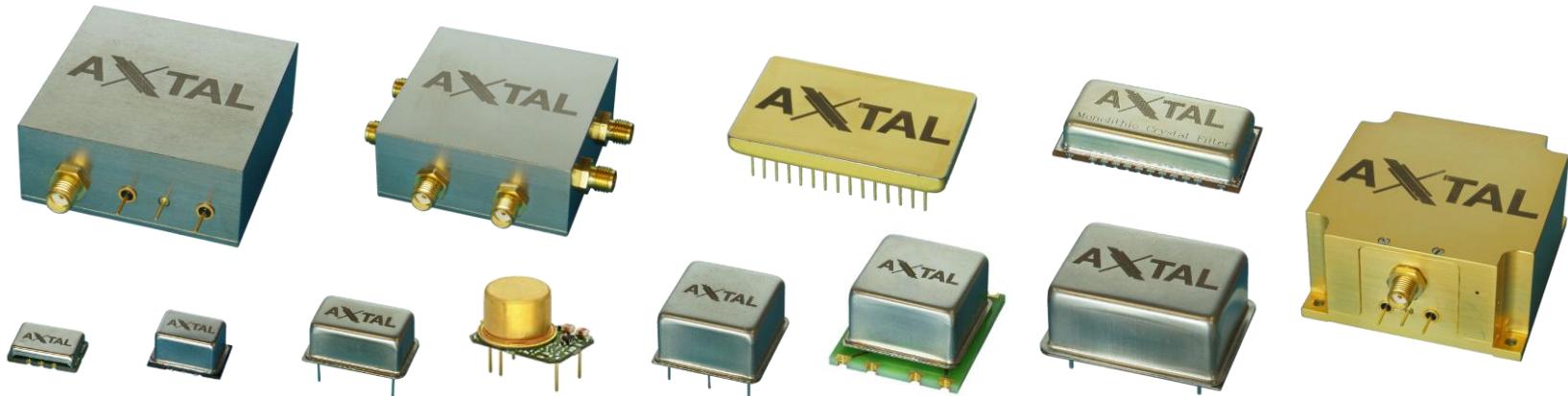
# Production Environment





# Product Overview

SPXO    VCXO    TCXO    OCXO    PLXO    SAW    Space  
Masterclocks    Frequency References    Atomic Clocks



Expert for customized oscillators and modules

Ultra-low noise & Very high stability

Wide frequency range up to 10 GHz

Various packages: THD, SMD, Connectorized and 19" Rack

Screening & Inspection IAW MIL-PRF-55310 and others



# OCXO

## Product Overview



### Miniature 9x14 mm Package

- ✗ Smallest OCXO – Hermetically-sealed
- ✗  $\pm 5$  ppb, -40°C to +85°C



### Ultra-High Stability Double OCXO

- ✗ Eurocase 36x27 mm Package
- ✗  $\pm 0.05$  ppb, -20°C to +70°C



### Ultra-Low Noise

- ✗ Supreme close-in phase noise
- ✗ Noise floor down to -185 dBc/Hz



### Vibration-isolated

- ✗ G-Sensitivity down to 0.001 g<sup>2</sup>/Hz
- ✗ Noise floor down to -180 dBc/Hz
- ✗ Functional profile up to 25 g RMS
- ✗ Customized Absorbers

### Multiplied Ultra-Low Noise

- ✗ Up to 10 GHz
- ✗ Multiple Outputs
- ✗ Fully customizable



### Low Power Fast Warm-up

- ✗ Warm-up 60 sec
- ✗ Power Consumption <300 mW
- ✗ Small Size



# TCXO

## Product Overview

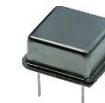


### Miniature SMD Packages

- ✗ 5x3.2 mm & 7x5 mm
- ✗ High Stability down to  $\pm 50$  ppb
- ✗ Low noise & Low g-Sensitivity

### High Stability

- ✗ Down to  $\pm 50$  ppb,  $-40 \sim +85^\circ\text{C}$
- ✗ Various packages available



### High frequencies

- ✗ Up to 8 GHz using PLL or Multiplication
- ✗ Low phase noise & low phase jitter
- ✗ Various packages available



### Lowest Vibration Sensitivity

- ✗ G-Sensitivity down to 0.2 ppb/g
- ✗ Noise floor down to  $-180$  dBc/Hz
- ✗ Functional profile up to 25 g RMS



# Modules & Space

## Product Overview

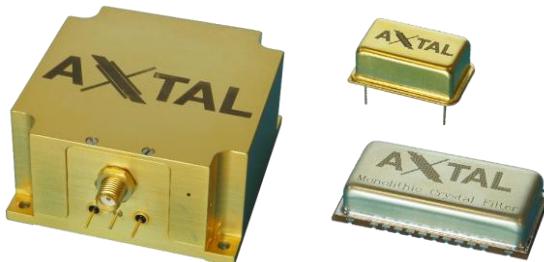


### GHz Crystal-Controlled Sources

- ✗ Various Gated Oscillators for Air Traffic Control and IFF
- ✗ PLL, Frequency Multiplication and SAW
- ✗ All stability classes up to 10 GHz

### PLL Oscillator Modules

- ✗ SPXO – TCXO – OCXO Stability
- ✗ Programmable models
- ✗ Multiple outputs
- ✗ Fully customizable



### Space & New Space

- ✗ SPXO – VCXO – TCXO – OCXO – Monolithic Crystal Filter
- ✗ MIL-PRF-55310 Level "S" and High Radiation Hardness
- ✗ Broad New Space Portfolio (see AXTAL Space Presentation)
- ✗ ESA EPPL Listed OCXO AXIOM6060
- ✗ Heritage: GEO, Extra-planetary & LEO (mega) constellations



# Frequency References & Distribution

## Product Overview



### Masterclocks

- ✗ Masterclocks for the most demanding Timing and Frequency Generation Systems
- ✗ Fully-customized in acc. with your requirements
- ✗ State-of-the-art Performance & Technology



### Frequency Distribution

- ✗ Frequency References: OCXO – Rubidium – GPS-disciplined
- ✗ Ultra-Low Noise & Very High Stability
- ✗ Low Noise Distribution Amplifier up to 16 outputs

### Atomic Clocks

- ✗ Manufacturer: ELECSPN “Spaceon”
- ✗ Miniature CPT Atomic Clock
- ✗ Rubidium Clocks



# AXTAL Customers



**BAE SYSTEMS**

**HENSOLDT**  
Detect and Protect.

**DIEHL**  
Aerospace

**ThalesAlenia Space**  
a Thales / Leonardo company

**TESAT**  
SPACECOM  
PIONEERING WITH PASSION

**NORTHROP GRUMMAN**

**AIRBUS**  
DEFENCE & SPACE

**RHEINMETALL**  
GROUP

**LEONARDO**

**Fraunhofer**

**ADVANTEST**



**HZB** Helmholtz  
Zentrum Berlin

**Honeywell** | AEROSPACE TECHNOLOGIES



**ROHDE & SCHWARZ**

**Hanwha Aerospace**

**CESIUM ASTRO** ■  
SPACE & DEFENSE SYSTEMS



**Indra**

**LOCKHEED MARTIN** ■

**OHB**

*and many more...*



# AXTAL Website



The screenshot shows the AXTAL website homepage. At the top, there is a navigation bar with links for Home, About AXTAL, Products, Quality, News, Support, Jobs, and Contact. The main content area features a large image of a building with solar panels. Below the image, the text "WELCOME TO THE EXPERT FOR FREQUENCY CONTROL AND PIEZO SENSORS" is displayed. The page is divided into several sections: "OUR PRODUCTS" (Crystal Oscillators, Oscillator Modules, Frequency Reference Units & Distribution), "MISCELLANEOUS PRODUCTS" (Precision Crystals, Quartz Crystal Units, Crystal Filters, Evaluation Boards, Frequency Counter Modules), "PRODUCT SEARCH" (Oscillator Search, Other Products, Catalog, Legacy Products), and "Q-TECH PRODUCTS" (Q-Tech Corporation, Q-Tech Product Overview, Q-Tech Product Search). The AXTAL logo is visible in the bottom right corner of the page.

[www.axtal.com](http://www.axtal.com)

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- ✖ Download Catalog and Datasheets
- ✖ Technical Notes & Archive
- ✖ Check out where you can meet us on Trade Shows & Conferences